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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/600,571

06/23/2003

Masao Hori

HARA-072-046

9645

20374 7590 07/17/2007  
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EXAMINER

NGUYEN, TU MINH

ART UNIT

PAPER NUMBER

3748

MAIL DATE

DELIVERY MODE

07/17/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No. 10/600,571	Applicant(s) HORI ET AL.	
	Examiner Tu M. Nguyen	Art Unit 3748	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 April 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4, 7, 8 and 11-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 7, 8 and 11-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☒ Certified copies of the priority documents have been received in Application No. 08/875,577.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>20070118</u> | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

1. An Applicant's Response filed on April 30, 2007 has been entered. Overall, claims 1-4, 7, 8, and 11-16 are pending in this application.

#### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-4, 7, 8, and 11-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Katoh et al. (U.S. Patent 5,402,641) in view Leyrer et al. (U.S. Patent 5,643,542).

Re claims 1 and 11, as illustrated in Figures 1 and 5, Katoh et al. disclose a process for purifying exhaust gas from lean burning internal combustion engines, comprising the steps of:

- preparing an exhaust gas purifying-use catalyst (6) for purifying first exhaust gas produced under a driving condition at which an air-fuel ratio is stoichiometric (see lines 3-8 of the Abstract), the exhaust gas purifying-use catalyst consisting essentially of a noble metal, said catalyst including platinum (see line 65 of column 3) and a fire-resistant inorganic oxide (active alumina, line 62 of column 3) carrying the noble metal, the fire-resistant inorganic oxide being active alumina; and

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- purifying exhaust gas from a lean burning engine by contacting the exhaust gas with the single exhaust-gas purifying-use catalyst (6); and

wherein the exhaust gas varies between the first exhaust gas (stoichiometric or rich air-fuel ratios) having an exhaust-gas temperature in a range of 350 to 800°C at an inlet of the catalyst (step 106 with YES answer and step 108), and a second exhaust (lean air-fuel ratios) that forms a more oxidizing, low-temperature atmosphere as compared with the first exhaust gas, depending on changes in air-fuel ratio, and

wherein the second exhaust gas is controlled so as to have an exhaust-gas temperature which is lower than the first exhaust gas, and which is in a range of 200 to 350°C at the inlet of the catalyst (step 106 with NO answer and step 110).

Kato et al., however, fail to disclose that their engine is a gasoline fuel-direct-injection type engine which allows fuel to be directly injected inside a cylinder of the engine; and that an amount of the noble metal being in a range of 0.01 to 50 g/liter with respect to the catalyst volume, an amount of the fire-resistant inorganic oxide being about 50 to 300 g/liter with respect to the catalyst volume, and a water-soluble compound being used as a source of the noble metal.

Kato et al. disclose the claimed invention except for applying the invention to a gasoline fuel-direct-injection type engine. It would have been obvious to one having ordinary skill in the art at the time the invention was made to apply the invention of Kato et al. to a gasoline fuel-direct-injection type engine, since the recitation of such amounts to an intended use statement. Note that a gasoline fuel-direct-injection engine also generates exhaust gases containing harmful emissions of HC, NO<sub>x</sub>, soot, CO, and SO<sub>x</sub>, that require purification before the gases can be released to the atmosphere; and the mere selection of the purification process of Kato et al. for

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use in a gasoline fuel-direct-injection engine would be well within the level of ordinary skill in the art.

As indicated in the Abstract and in the claims, Leyrer et al. teach a NO<sub>x</sub> conversion catalyst adapted to purify hydrocarbons, carbon monoxide, and NO<sub>x</sub> in the exhaust gas of an internal combustion engine. The NO<sub>x</sub> conversion catalyst comprises a catalytically active coating having a platinum metal group and a high surface area support material (claim 1). The platinum metal group is in a range of 0.01 to 5 g/liter of the catalyst volume (claim 9) and is obtained from a water-soluble compound (lines 38-49 of column 5, line 6 of column 7). The high surface area support material is a fire-resistant inorganic oxide (aluminum oxide/silicon oxide) in a range of about 200 g/liter with respect to the catalyst volume (lines 1-3 of column 7). It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the amounts of platinum and inorganic oxide taught by Leyrer et al. in the catalyst of Katoh et al., since the use thereof would have provided a catalyst having high efficiencies in removing HC, CO, and NO<sub>x</sub> in the exhaust gas.

Re claim 2, in the modified process of Katoh et al., the exhaust gas is purified by removing hydrocarbon, carbon monoxide, and nitrogen oxides from the exhaust gas by the use of the catalyst (6).

Re claims 3-4, in the modified process of Katoh et al., the first exhaust gas state appears when the air-fuel ratio is in the range of 13 to 15 (stoichiometric or rich air-fuel ratios), and the second exhaust gas state (lean air-fuel ratios) appears when the air-fuel ratio exceeds the above-mentioned air-fuel ratio, wherein the second exhaust gas state appears when the air-fuel ratio ranges from more than 15 up to 50.

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Re claim 7, in the modified process of Katoh et al., the catalyst (6) further comprises a transition metal (vanadium) (see claim 5 of Leyrer et al.), an amount of the transition metal being in a range of 0.01 to 50 g/liter with respect to the catalyst volume (see claim 9 of Leyrer et al.), and a water-soluble compound being used as a source of the transition metal contained in the catalyst (lines 50-55 of column 5 in Leyrer et al.).

Re claim 8, in the modified process of Katoh et al.,

- the gasoline engine includes obviously a cylinder that serves as a combustion chamber for gasoline as a fuel; an ignition plug (not shown but obviously must have); an injector (not shown but obviously must have) that is used for injecting the fuel; a control section (8) for controlling an ignition timing of the ignition plug and an amount of fuel injection of the injector, and

- the control section (8) controls an air-fuel ratio depending on the injector so as to cause the gasoline engine to be in the second exhaust gas state.

Re claim 12, in the modified process of Katoh et al., the catalyst further contains, as a co-catalyst, a rare-earth metal (line 67 of column 3).

Re claims 13-14, in the modified process of Katoh et al., the single exhaust-gas purifying-use catalyst that consists essentially of a noble metal (platinum) is obtained by impregnating a noble metal in the fire-resistant inorganic oxide.

Re claim 15, in the modified process of Katoh et al., the second exhaust gas (lean air-fuel ratios) is controlled so as to have an exhaust-gas temperature in a range of 200 to 300°C at the inlet of the catalyst (step 106 with NO answer).

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4. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Katoh et al. in view Leyrer et al. as applied to claim 1 above, and further in view of legal precedent.

The modified process of Katoh et al. discloses the invention as cited above, however, fails to disclose that the second exhaust gas is controlled so that an exhaust-gas temperature of the second exhaust gas is at least 200°C lower than an exhaust-gas temperature the first exhaust gas, at the inlet of the catalyst.

Katoh et al. disclose the claimed invention except for specifying that the second exhaust gas is controlled so that an exhaust-gas temperature of the second exhaust gas is at least 200°C lower than that for the first exhaust gas. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a specific optimum value of the second exhaust gas temperature, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

#### ***Response to Arguments***

5. Applicant's arguments with respect to the reference applied in the previous Office Action have been fully considered but they are not persuasive.

In response to applicant's argument that the combination of Leyrer et al. with Katoh et al. is improper because neither reference describes a direct fuel-injection gasoline engine (page 2 of the Response), the examiner respectfully disagrees.

The claim in the pending application that the pending invention is directed to a direct fuel-injection gasoline engine has been determined as an "intended use statement". The

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examiner has noted that most internal combustion engines (which includes the engine in the pending application and lean burning engine in Katoh et al.) that utilize a hydrocarbon source as a fuel generate exhaust gases containing harmful emissions of HC, NO<sub>x</sub>, soot, CO, and SO<sub>x</sub>, that require purification before the gases can be released to the atmosphere; and the mere selection of the purification process of Katoh et al. for use in a direct fuel-injection gasoline engine would be well within the level of ordinary skill in the art.

In response to applicant's argument that the combination of Leyrer et al. with Katoh et al. is still improper because the examiner fails to provide a motivation, suggestion, or teaching to apply the method of Katoh et al. to a fuel-direct-injection gasoline engine (page 3 of the Response), the examiner again respectfully disagrees.

In Katoh et al., the purification process is applied to an engine capable of running at lean air-fuel ratios (see the Abstract). Since Katoh et al. did not limit their process to a specific hydrocarbon fuel, it is at least obvious to one with ordinary skill in the art that their process is also applied to a gasoline engine that is known to be capable of running at a lean air-fuel ratio. Katoh et al., however, fail to specifically mention that their gasoline engine is a direct injection type. Even if the engine in Katoh et al. is a carburetor type, the examiner maintains that such engine still generates exhaust gases containing harmful emissions of HC, NO<sub>x</sub>, soot, CO, and SO<sub>x</sub>, that require purification before the gases can be released to the atmosphere; and the mere selection of the purification process of Katoh et al. for use in a direct fuel-injection engine would be well within the level of ordinary skill in the art. Thus, the examiner has provided a clear motivation (i.e., removing harmful emissions from exhaust gases before releasing the gases to the atmosphere) to apply the method of Katoh et al. to a fuel-direct-injection gasoline engine.



***Conclusion***

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

***Prior Art***

7. The IDS (PTO-1449) filed on January 18, 2007 has been considered. An initialized copy is attached hereto.

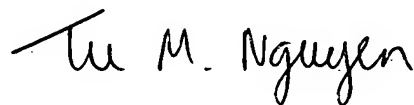
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*Communication*

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (571) 272-4862.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



TMN

July 8, 2007

Tu M. Nguyen

Primary Examiner

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